



*ASSOCIATION CONNECTING  
ELECTRONICS INDUSTRIES*

# **Certification For RoHS Lead Free Electronics Assembly Process Capability Program**

**John Kania, IPC**

# *IPC Lead Free Process Certification*

## *Focused*



# ***IPC Lead Free Process Certification***

- Conceived and created by the industry for the benefit of the industry.
- Help industry prepare for lead-free requirements of the EU RoHS Directive.
- EMS and OEM's



# *IPC Lead Free Process Certification*

- Confirm your internal RoHS lead free preparations.
- Validate your lead free process capabilities to your customers and suppliers.



# *IPC Lead Free Process Certification*

“The IPC certification audit program has a **simple goal**: to audit an electronics assembly facility...and determine if the facility has processes and procedures in place to demonstrate that it is capable of producing product to meet the lead free requirements of the RoHS Directive”

# *IPC Lead Free Process Certification*

## *Technically Competent*





# *IPC Lead Free Process Certification*

- Initial program developed by two content experts.
- Over 40 years experience in electronics assembly industry.
- Leaders in RoHS lead free process implementation.



# ***IPC Lead Free Process Certification Blue Ribbon Committee***

- AIM
- Apsco
- Celestica
- Cookson Electronics
- Fawn Industries
- Flextronics International
- GE Healthcare
- Hewlett-Packard
- Jabil Circuit
- Kester
- Plexus
- Raven Industries
- Solectron
- Vitronics Soltec

# *IPC Lead Free Process Certification*

- Auditor and Beta site validation
  - Solectron Charlotte
  - Raven Industries



# *IPC Lead Free Process Certification*

## *How it works*

- *301 question self-audit checklist (15 sections)*
- *Two day on-site facility audit*



# ***IPC Lead Free Certification Self-Audit Checklist***

- General
- Training
- Surface Mount Assembly
- Wave Soldering
- Rework and Repair
- Assembly Materials
- Components
- Design and Engineering
- Test and Inspection
- Materials Assembly Database
- Materials Procurement
- Materials Warehouse
- Materials Field Return
- Quality
- Materials Declaration



# *IPC Lead Free Certification*

# *Fair*

# *Steps to Certification*

[www.ipc.org/LFCert](http://www.ipc.org/LFCert)

- Are you tall enough for the lead free ride?
- Sample Checklist
- Self-audit checklist (30 business days)
- On-site audit (90 business days)
- Audit report (14 business days)
- Certification
- Appeal/re-audit
- Re-certification



# *IPC Lead Free Certification*

## *Cost Effective*



# *IPC Lead Free Process Certification*

- \$7,000 IPC members
- \$10,000 non-members
- \$1,000 auditor expenses



# ***IPC Lead Free Process Certification***

- Now available globally.
- Audits currently underway:
  - Axiom Manufacturing Services (U.K.)
  - CTS Electronics Manufacturing Solutions, Inc.
  - Riverside Electronics LTD.



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# *The Certification for RoHS Lead Free Electronics Assembly Process Capability Program*

Greg Munie  
Kester



# Outline

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- **Value to the Industry**
- **Comments on Test Audits**
- **Summary**

# *The Certification for RoHS Lead Free Electronics Assembly Process Capability Program*

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## ***Value to the Industry:***

- In a time of rapid change in response to external pressure the process provides assemblers with a honest and technically sound method of assessment of their readiness for the RoHS lead free requirements.
- The audit process provides expert and confidential feedback on technical capability, training and documentation.
- Even for a company now building lead free assemblies the review exercise provides a third party assessment based on accepted industry practices.

# *The Certification for RoHS Lead Free Electronics Assembly Process Capability Program*

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## ***Value to the Industry:***

- 3<sup>rd</sup> party validation provides a “sanity check” with respect to internal company efforts.
- The IPC auditor selection process insures that the audits will be conducted only by those with extensive assembly experience: judgments are made only by those who have “been there and done that.”
- For small and medium manufacturers this is an opportunity to use general industry knowledge and experience in crafting their own path to lead free readiness.
- The audit process is not “hermetic”: knowledge exchange is part of the process. You have the opportunity to learn from the exercise!



# *The Certification for RoHS Lead Free Electronics Assembly Process Capability Program*

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## ***Beta Site Audits:***

- Two completed to date in the U.S.
- Feedback from U.S. audits (Auditor and audited) been incorporated into audit forms and process to improve quality.
- Comments received back from audited companies indicate that the exercise provides process improvement benefits that go beyond certification.

# *The Certification for RoHS Lead Free Electronics Assembly Process Capability Program*

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## ***Beta Site Feedback:***

- "We were very satisfied with the technical knowledge and approach of the auditor and felt it lead to a good interchange of ideas and discussion."
- "The program allowed [us] to benchmark our RoHS lead free readiness against . . . technical experts. This will be a stepping stone to improve our own RoHS lead free process audit questionnaire and readiness."
- "It highlighted to the team the importance of "due diligence" of some critical areas and future questions that may be asked of our customers."

# *The Certification for RoHS Lead Free Electronics Assembly Process Capability Program*

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## ***Summary:***

- This program provides an industry developed, fair, third party assessment of a companies lead free process capability.
- The audit process itself provides feedback to the audited organization on process improvement.
- Certification through the IPC audit program provides a high level of confidence to a companies customers that their supplier has the capability to meet the lead free requirements of the RoHS Directive.
- This is not just a certification exercise; it is a learning and **improvement** process!



# **IPC Certification For RoHS Lead Free Electronics Assembly Process Capability Program**

**Lesson Learnt Summary  
Solectron Beta RoHS Audit  
Leo Lambert, EPTAC Corp**

# EPTAC

- Founded 1997,
- Leading provider of training and certification for the electronic industry.
- Deliver training in PC Board Technology, Fiber Optic Technology, Cable and Wire Harness, Wire Harness Assembly.
  - For each technology, we offer basic training for those with little experience as well as advance training.
- Provide Consulting services to entire Electronic Industry.

# Preceding the IPC Audit

- Learn the audit procedures and prepare to conduct the audit
- Understand the objectives of the IPC audit
  - Review all questions in questionnaire
- Get copy of Lead-Free roadmap from customer
  - Define whether or not audit is for
    - EMS
    - OEM
    - Supplier/Distributor
- Verify flexibility of roadmap

# Preceding the IPC Audit

- Verify personnel assignments are defined and in place.
- Try to define lead time from design to product release
- Define whether or not this program has been funded by upper management

# Self Audit Questionnaire

Identify company or facility operational business:

- EMS House
  - High volume, low mix
  - Low volume, high mix
- OEM
- Supplier
  - This information impacts the assessment of various process commitments

# Initial Facility Meeting

## Audit Awareness

Emphasize:

- Conversion to lead free is not as simple as many people perceive
- Controls of materials is more important than physical assembly process
- Verify material control processes
  - Check for repeatability of this process
- Verify personnel have been trained

# Initial Facility Meeting Audit Awareness

Verify the following items with facility personnel

- Cost of program and has it been budgeted
- Inconvenience of implementing for various customers
- Does the roadmap reflect this difficulty

# Component Documentation

- Define who is responsible for Material Declaration Sheets.
- How are they collecting the MDS information?
- Get the plan for the distribution of MDS information.

# IPC Auditor Requirements

Auditor should:

- Be cognizant various assembly processes
- Eliminate personal bias of any manufacturing processes styles and techniques
- After reviewing questionnaire, summarize some questions to help review the total facility and eliminate ambiguities within the answers provided by the questionnaire.

# Material Control

## Lead free program

- Define whether there is a part number program in place and is part storage segregated or are the materials mixed within storage area?
  - Go review storage area
- If yes, how are the part segregated within the manufacturing operation?
- How are the parts segregated when issued to manufacturing?
- How do the assembly operators know what is lead free and what is not?
- Define who does the training and how were they trained?

# Process Review

- Keep communications open with customer
- Propose an agenda for the visit
- Define paperwork to be provided for review based upon the questionnaire submitted
- Define sections of manufacturing which will be reviewed and audited.

# Process Review

- Finalize agenda for meeting and follow it.
- After meeting, collect and collate information to provide customer with results and conclusions of audit.
- Define whether or not there is more work to be done to successfully pass the audit.
- Provide conclusion and result report at closing meeting and to IPC for follow on action with customer.



**Sollectron Charlotte**  
**IPC Certification for RoHS Lead-Free Electronics**  
**Assembly Process Capability**  
**Beta Test Site**

**Jenny Porter – Site RoHS Lead**

**May 2006**

# Solectron Fast Facts

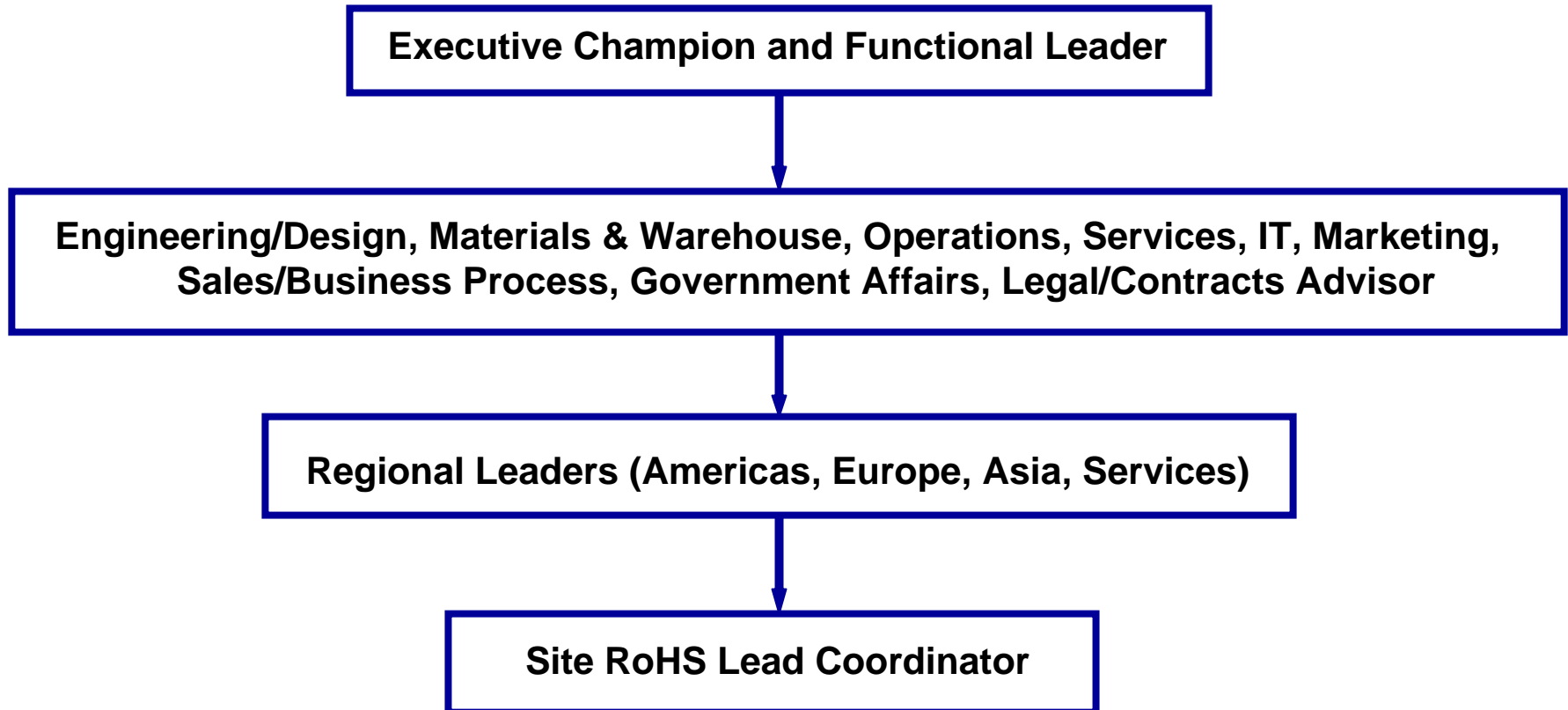
- Founded in 1977
- Headquartered in Milpitas, Calif.
- Sales of \$10.4 billion in fiscal 2005
- Serving customers in communications, networking, computing and storage, consumer products, automotive, medical and industrial markets
- Traded on the NYSE, under the symbol SLR
- Two-time winner of the Malcolm Baldrige Award

# Solectron Global Footprint



# Overview of Solectron's RoHS Readiness

- ❑ **Corp Environmental Compliance Team** established to provide direction and support in development of corp. specifications for lead-free and RoHS polices, procedures and specifications.



# Overview of Solectron's RoHS Readiness

## □ Corp Environmental Compliance Team

Function	Goals
Engineering/Design	<ul style="list-style-type: none"> <li>• Develop &amp; define RoHS technical process, equipment, tooling &amp; chemistry</li> <li>• Sites qualification process</li> <li>• FA testing &amp; reporting</li> </ul>
Materials/Warehousing	<ul style="list-style-type: none"> <li>• Materials DFE services (Assess, status and convert BOMs)</li> <li>• RoHS materials, warehouse and logistic management strategy &amp; definition</li> </ul>
Operations	<ul style="list-style-type: none"> <li>• RoHS compliant manufacturing, training, equipment needs &amp; site readiness worldwide (PB-free)</li> </ul>
Services	<ul style="list-style-type: none"> <li>• Establish &amp; support take-back logistics programs (WEEE)</li> <li>• RoHS compliant Repair services (PB-free)</li> </ul>
IT	<ul style="list-style-type: none"> <li>• Develop &amp; Implement global database for materials compliance management</li> <li>• DFE (Design for Environment) materials BOM scrub tools</li> </ul>
Marketing	<ul style="list-style-type: none"> <li>• Create RoHS DFE (Design for Environment) services, solutions and pricing</li> <li>• Train &amp; enable sales force</li> </ul>
Sales/Business Process	<ul style="list-style-type: none"> <li>• RoHS complaint manufacturing services and quotation models</li> <li>• Drive add-on manufacturing business</li> </ul>
Government Affairs	<ul style="list-style-type: none"> <li>• Guide Solectron RoHS Strategies (Environmental Regulatory Expert)</li> <li>• Assess &amp; Anticipate future environmental laws &amp; directions</li> </ul>
Legal/Contracts advisor	<ul style="list-style-type: none"> <li>• <i>Assess &amp; guide Solectron's customer contracts in support for RoHS DFE &amp; compliant manufacturing services.</i></li> </ul>

# Overview of Solectron's RoHS Readiness

## □ Communication

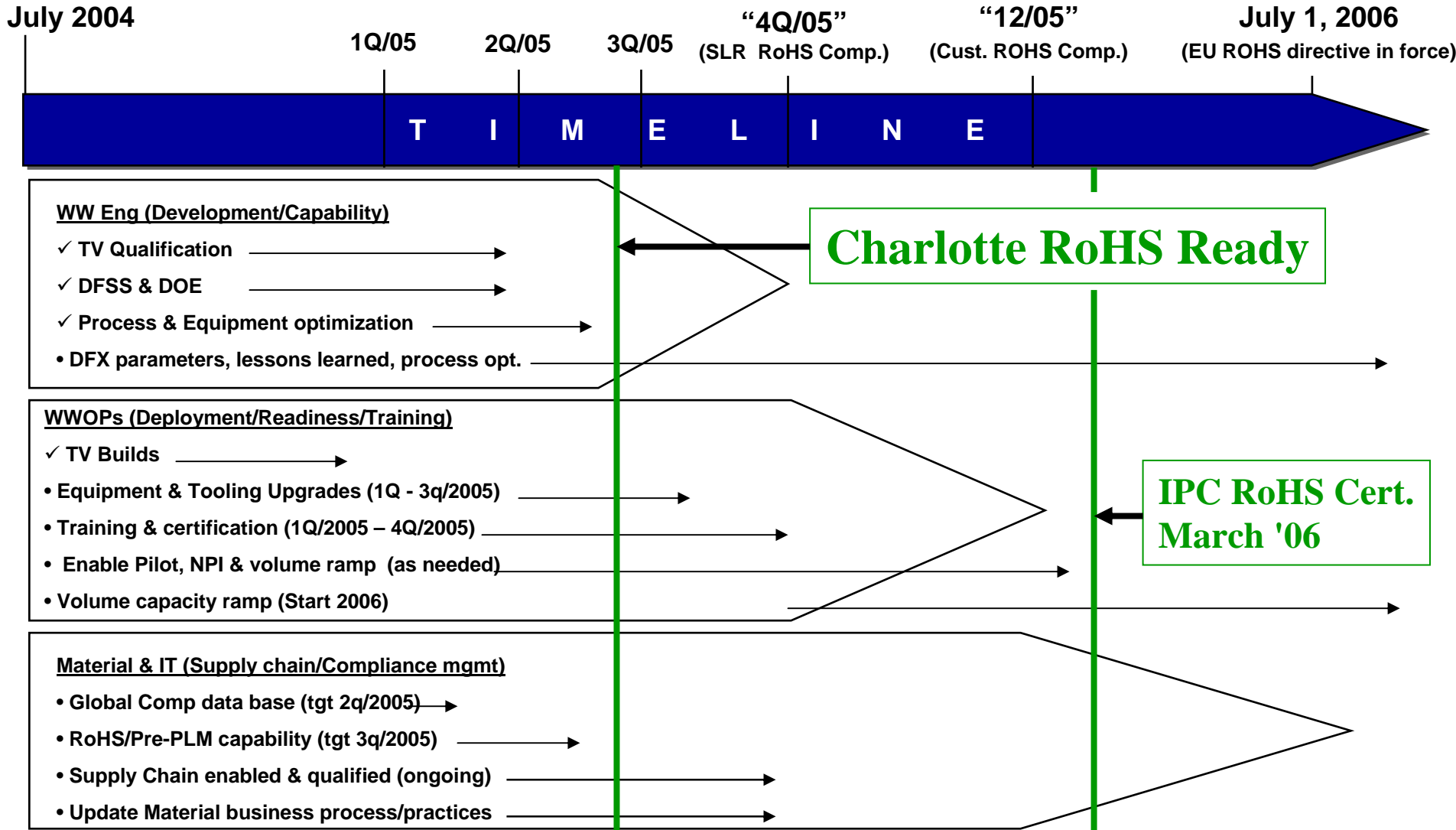
- ❖ RoHS portal on **MySolectron** developed to be focal point for all Solectron sites worldwide
  - Latest communications and training packages
  - Specifications and procedures
  - Best Practice sharing between sites WW on lead-free
  
- 4 main areas of focus
  - WWOPs
  - Design & Engineering
  - Global Materials
  - Sales & Marketing

# Corp RoHS Readiness Certification Process

## ❑ Site Level RoHS Readiness Requirements

- ❖ Required to complete Solectron's Lead-Free SMT & PTH/Wave test vehicle builds and associated laboratory analysis that validate proficiency in PCBA Lead-Free soldering & rework
- ❖ Solectron's **200-question** RoHS self-assessment checklist that thoroughly examines the areas of:
  - ✓ Training
  - ✓ Materials & Warehouse Management
  - ✓ Manufacturing Process & Control
  - ✓ Quality Management System
- ❖ Solectron's detailed Corporate on-site audit to view evidence of site's RoHS preparations, controls, technical understanding, and compliance readiness.
- ❖ RoHS Site Training
  - ✓ All SLR associates received awareness training, plus specialized training for specific areas
  - ✓ IPC610-D Certification for required associates

# Key RoHS Readiness Time Line & Milestones



# Solectron Charlotte IPC Beta Test Audit Preparation

## □ Initial Contact / IPC Required Time Line

- ❖ IPC contacted SLR Charlotte in DEC '05 and asked if interested in being the large EMS beta test site.
  - Charlotte's feedback , during the 'beta test', will be an important part in the final version of the **Self Audit Checklist** and "would be **welcomed**"
    - ✓ **Signed Terms and Conditions**
- ❖ JAN '06, received IPC materials
  - ✓ **Audit Instructions**
  - ✓ **Self-Audit Checklist (300 questions)**
  - ✓ **Appeals Instructions**
- ❖ FEB '06, Self-Audit Checklist and supporting documentation to be received at IPC (30 days after receipt)... "**how much to submit?**"

## □ Key Considerations

- ✓ *Charlotte felt that this would be a wonderful way to validate our corp. and site RoHS readiness efforts*
- ✓ *Gain knowledge on what are the expectations from the technical experts that created the audit requirements*
- ✓ *Receive IPC Certification for RoHS*

# Solectron Charlotte IPC Beta Test Audit Preparation

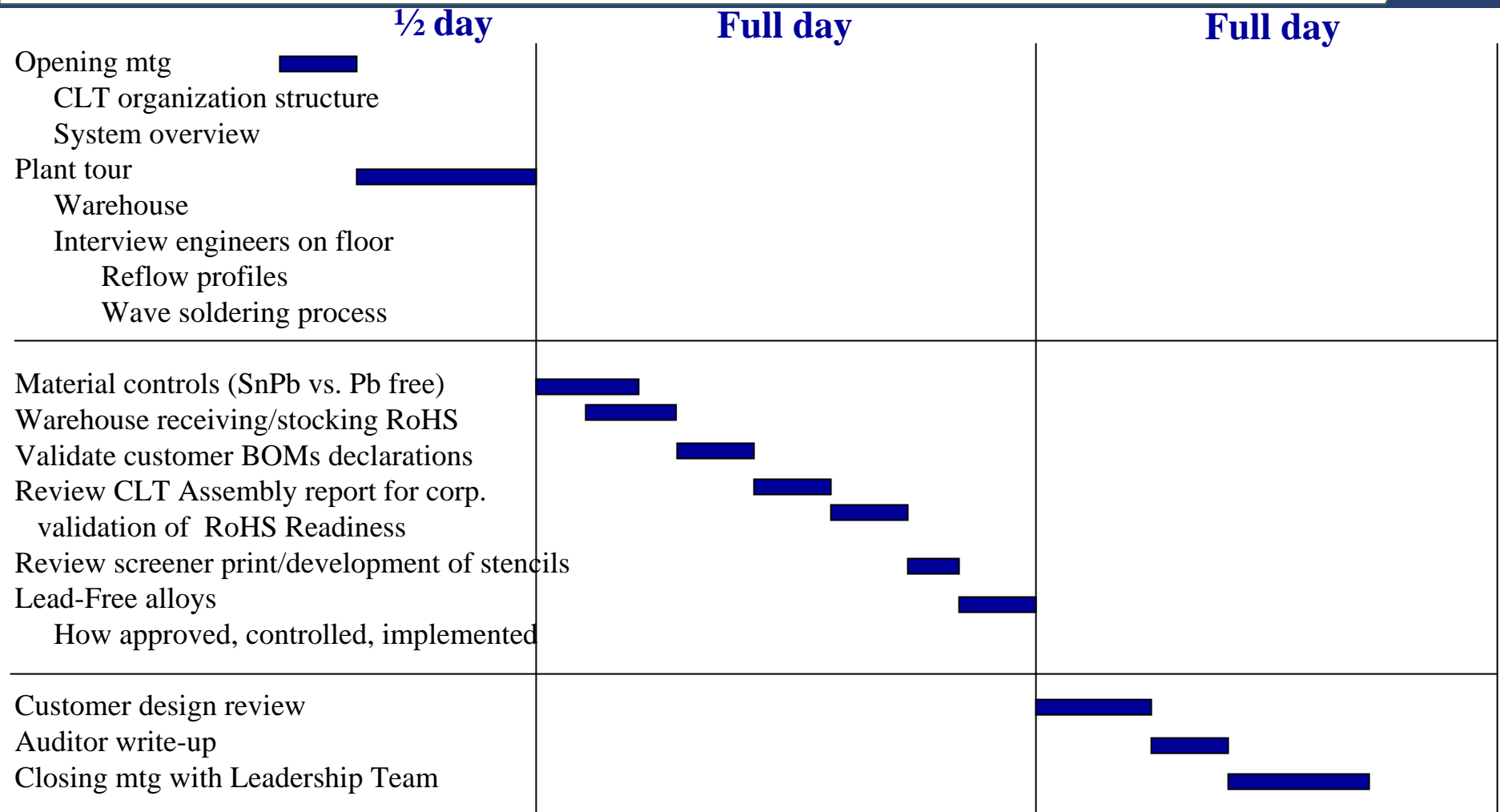
## □ Site RoHS Council

- ❖ Reps from all functional areas of the business were chosen to focus on IPC Self- Audit Checklist 15 required sections
  - Materials
  - Warehouse
  - Engineering Services
  - Operations
  - Quality
  - Program Management
  - Design & Engineering
- ❖ Weekly reviews/check-point to identify & close open issues
- ❖ Prepare feedback to IPC on Self-Audit Checklist questions
  - Content?
  - Is it valid?
  - Redundancy?

# Solectron Charlotte IPC Beta Test Audit Preparation

- **Jan '06**, received materials
  - ❖ Reviewed materials
  - ❖ Set-up RoHS Council for weekly review, signing owners to the 15 sections
  - ❖ Determine what supporting documentation will be sent
    - Environmental Compliance Team (function & goal)
    - Corp procedures, training packages, RoHS development, customer presentation, qualification requirements for RoHS Readiness
      - Allows auditor to ask about CLT processes and procedures that follow corp. direction (customer qualifications, site training, controls, processes)
- **Feb '06**, set audit dates with IPC
- **2 weeks prior** to audit, IPC auditor sent proposed list of items to review during audit
  - Confirm processes
  - Documentation procedures
- Regulatory Program Mgr published audit schedule to ensure 'key' auditor objectives are met and support available...**2.5 days**

# On-Site Audit Process Flow



# Solectron Charlotte IPC Audit

## □ Beta Test Auditor

- ❖ Leo P. Lambert, EPTAC Corp., IPC Program Auditor
  - ✓ Very knowledgeable on SLR's core business...circuit board assembly
  - ✓ Complete understanding of industry standards (IPC, JEDEC)
    - Latest standards...e.g., IPC-1752, Material Declaration
  - ✓ Understood RoHS requirements (EU Directive, WEEE)
  - ✓ Management structure
  - ✓ Quality system expectations
  - ✓ Equipment and equipment capabilities
  - ✓ Process controls
  - ✓ Audit techniques to get objective information
  - ✓ Audit planning
    - Thorough review of supporting documentation sent by CLT
    - Good communication, prior to visit, on key items to review during the on-site audit to confirm processes and documentation procedures are being followed
  - ✓ Unbiased feedback during audit and final report-out to site leadership

# Questions?

- **Contact Info:**

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